

REMARKS

Claims 1-3, 6, 7 and 9-12 have been examined. New claims 13-23 have been added to further describe the patentable features of the present invention.

I. Rejection to Claims 1-2, 6-7 and 11-12 - 35 U.S.C. § 103

Claims 1-2 and 6-7 and 11-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ota et al. (US 6,442,184) in view of Steigerwald et al. (US 2004/0113163). Applicants traverse the rejection based on the following comments.

A. Claims 1 and 7

Claim 1, as amended, recites:

a substrate, and a plurality of Group III nitride semiconductor layers provided on the substrate, wherein a first layer which is in contact with the substrate is composed of silicon-doped $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ($0 < x \leq 1$) and has a structure formed of aggregated columnar crystal grains having a width of 10 to 50 nm.¹

The Examiner correctly concedes that Ota fails to teach a structure formed of aggregated columnar crystal grains having a width of 10 to 50 nm, but cites to Steigerwald for teaching this feature of claim 1. Steigerwald, however, merely teaches that the textured layer 37 has a height and width between about 0.06 micron and about 10 microns (i.e., 60-10,000 nm) (paragraph 14). Therefore, Steigerwald arguably fails to teach crystal grains having a width of 10 to 50 nm.

In view of the above, Ota, alone or in combination with Steigerwald, fails to teach or suggest each and every feature of claim 1. Therefore, claim 1 should be patentable for at least this reason.

¹ Support for the upper limit of 50 nm at page 21, lines 12-19 of the specification and Fig. 1.

Claim 7 includes analogous, though not necessarily coextensive features recited in claim 1, and therefore, claim 7 is patentable for the reasons discussed for claim 1.

B. Claim 6

Claim 6 recites that “the first layer has a thickness of 20 nm to 200 nm.” The Examiner apparently concedes that Ota fails to teach this feature of claim 6, and cites to Steigerwald for teaching the same. In particular, the Examiner asserts that Steigerwald teaches that the textured layer 37 has a thickness (height) between 0.06 micron (60 nm) and 1 micron (1,000 nm) which includes the claimed range. However, Ota teaches that the first crystal layer 3 has a thickness of 1 micron (1,000 nm) or of 5 microns (5,000 nm) (col. 3, lines 35-36, and col. 5, lines 1-2). The Examiner fails to provide any reason for modifying Ota, which teaches a thickness between 1,000 and 5,000 nm. That is, there is no teaching within the cited references, or provided by the Examiner, as to why a person of ordinary skill in the art would make such a significant reduction in the thickness of the first crystal layer 3 of Ota to 60 nm. Furthermore, there is no teaching that such a significant reduction in thickness to the first layer can be made in Ota. There must be a teaching or suggestion to combine with the cited art. Applicants submit there is no motivation to combine the references for this additional reason.

Therefore, Applicants submit that claim 6 should be patentable for at least these reasons.

D. Claims 2, 11 and 12

Applicants submit that the claims 2, 11 and 12 are patentable at least by virtue of their respective dependencies.

II. Rejections to Claim 3 - 35 U.S.C. § 103

Claim 3 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ota. Claim 3 recites, *inter alia*:

a substrate, and a plurality of Group III nitride semiconductor layers provided on the substrate, wherein a first layer which is in contact with the substrate is composed of $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ($0 \leq x \leq 1$), and the difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer provided thereon is 10 nm or more and is equal to, or less than, 99% the thickness of the first layer. (emphasis added)

The Examiner concedes that Ota fails to explicitly teach that the difference in height between a protrusion and a depression, which are present at the interface between the first layer and a second layer provided thereon, is 10 nm or more and is equal to, or less than, 99% the thickness of the first layer. However, the Examiner asserts that it would have been obvious to provide certain claimed ranges of aluminum composition, as involving only routine skill in the art.

The claimed feature of the difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer provided thereon is 10 nm or more and is equal to, or less than, 99% the thickness of the first layer, however, does not refer to a range of aluminum composition. Instead, it refers to a maximum height difference of a surface of the first layer at the interface between the first layer and a second layer, and a unique relationship thereof to the thickness of the first layer. Thus, the above claimed difference in height does not have any relationship to the aluminum composition of the first layer. Nothing in Ota teaches or fairly suggests the unique relationship of this feature as recited in claim 3. Furthermore, the Examiner's reason as to why this feature is obvious in view of Ota does not appear to be pertinent. Therefore, Applicants submit that claim 3 should be patentable for at least these reasons.

III. New claims

By this Amendment, Applicants have added new claims 13-23 to further define the claimed invention. Applicants respectfully submit claims 13-23 recite additional features which are not taught or suggested by the prior art of record.

IV. Request for Rejoinder

Withdrawn method claim 9 has been amended to include all of the limitations of product claim 1. If product claim 1 is found to be allowable, Applicants respectfully request rejoinder of the withdrawn claims pursuant to MPEP § 821.04.

V. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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